Chapter 12: Air Quality

12.1 Introduction

This chapter describes the air quality impacts associated with the Mountain View Corridor (MVC). Air quality in an area is a function of the area itself (size and topography), the prevailing weather patterns (meteorology and climate), and the pollutants released in the area. Air quality is described in terms of the concentrations of various pollutants in a given area of atmosphere (for example, micrograms per cubic meter).

Air Quality Impact Analysis Area. The MVC would be located within Salt Lake and Utah Counties, so these counties make up the impact analysis area for the air quality analysis.

12.2 Regulatory Setting

12.2.1 National Ambient Air Quality Standards (NAAQS) Requirements

National Ambient Air Quality Standards include primary national standards to protect public health and secondary standards to protect public welfare (such as protecting property and vegetation from the effects of air pollution). These standards, which are set by the U.S. Environmental Protection Agency (EPA), have been established as the official ambient air quality standards for Utah. For the pollutants addressed in this section, the primary and secondary standards are the same. The current NAAQS are listed in Table 12.2-1.

Table 12.2-1. National Ambient Air Quality Standards (NAAQS)

	National (EPA) Standard[a]	
Pollutant	**Primary**	**Secondary**
Lead (Pb)		
Quarterly average	1.5 μg/m^3	1.5 μg/m^3
Particulate Matter (PM_{10})		
24-hour average	150 μg/m^3	150 μg/m^3
Particulate Matter ($PM_{2.5}$)		
Annual arithmetic mean	15 μg/m^3	15 μg/m^3
24-hour average	35 μg/m^3	35 μg/m^3
Sulfur Dioxide (SO_2)		
Annual average	0.03 ppm	(no standard)
24-hour average	0.14 ppm	(no standard)
3-hour average	(no standard)	0.50 ppm
Carbon Monoxide (CO)		
8-hour average	9 ppm	(no standard)
1-hour average	35 ppm	(no standard)
Ozone (O_3)		
8-hour average	0.08 ppm	0.08 ppm
Nitrogen Dioxide (NO_2)		
Annual average	0.053 ppm	0.053 ppm

Annual standards are never to be exceeded. Short-term standards are not to be exceeded more than 1 day per calendar year unless noted otherwise.

μg/m^3 = micrograms per cubic meter

ppm = parts per million

PM_{10} = particulate matter 10 microns in diameter or less

$PM_{2.5}$ = particulate matter 2.5 microns in diameter or less

[a] Primary standards are set to protect public health. Secondary standards are based on other factors (for example, protecting crops and materials or avoiding nuisance conditions).

Source: EPA 2007c

If an area meets the NAAQS for a given air pollutant, the area is called an *attainment area* for that pollutant (because the standards have been attained). If an area does not meet the NAAQS for a given air pollutant, the area is called a *non-attainment area*. A *maintenance area* is an area that was previously a non-attainment area and has subsequently been redesignated as an attainment area. To be redesignated as a maintenance area, the area must both meet air quality standards and have a 10-year plan for continuing to meet and maintain air quality standards and other requirements of the Clean Air Act.

The pollutants in Table 12.2-1 above—that is, the pollutants that have associated NAAQS—are referred to as *criteria pollutants*.

12.2.2 National Environmental Policy Act Requirements

The guidance from the Federal Highway Administration (FHWA) (T6640.8A) and the Federal Transit Administration (FTA) for preparing environmental documents under the National Environmental Policy Act (NEPA) identifies the requirement to evaluate air quality in terms of mesoscale and microscale impacts. Mesoscale evaluations look at regional air quality impacts, while microscale evaluations look at localized air quality impacts, primarily at the road or intersection level.

12.2.3 Transportation Conformity Requirements

Salt Lake City, Salt Lake County, and Utah County are either non-attainment or maintenance areas for carbon monoxide (CO) or particulate matter (PM_{10}). In Utah County, the city of Provo is a maintenance area for CO but is outside the air quality study area for the MVC. Because of these designations, the State of Utah is required to develop a State Implementation Plan that explains how these areas will be brought back into compliance with the NAAQS for CO and PM_{10}. The State Implementation Plan identifies how air pollution from all sources—mobile sources, stationary sources, and area sources—will be reduced enough to meet the NAAQS. The allowed level of emissions for each type of pollution source is called an *emission budget*.

In areas where the air quality has improved enough that the NAAQS are no longer exceeded, a *maintenance plan* is prepared to demonstrate how the area will comply with the NAAQS for at least the next 10 years. These maintenance plans also become part of the State Implementation Plan.

The Clean Air Act and its amendments require that all new regionally significant highway and transit projects (such as the MVC) that are located in non-attainment and maintenance areas must be part of a "conforming" transportation plan[1] and Transportation Improvement Program. The northernmost section of the MVC in Salt Lake City between Interstate 80 (I-80) and State Route (SR) 201 is in the CO maintenance area, and the entire project is in the Salt Lake and Utah County PM_{10} non-attainment area (for which redesignations to maintenance areas are pending). For the MVC project, these requirements mean that (1) the MVC must be included in the Wasatch Front Regional Council's (WFRC) and Mountainland Association of Government's (MAG) regional transportation plan, and (2) this transportation plan must conform to the State Implementation Plan. A transportation plan conforms to the State Implementation Plan if the pollutant levels generated by the projects in the transportation plan are within the associated emission budgets in the State Implementation Plan.

In order to determine whether a transportation plan and Transportation Improvement Program conform to the State Implementation Plan, the metropolitan planning organization for the non-attainment or maintenance area in question performs a regional conformity analysis (sometimes called a *mesoscale* analysis) and meets all of the conformity requirements of 40 Code of Federal Regulations (CFR) 93. For the MVC project, the metropolitan planning organizations are WFRC for Salt Lake County and MAG for Utah County. An individual transportation project such as the MVC "conforms" to the State Implementation Plan if, by itself and in combination with the other planned transportation projects in the regional transportation plan and Transportation Improvement Program, the project would not result in any of the following conditions:

- New violations of the NAAQS
- Increases in the frequency or severity of existing violations of the NAAQS
- Delays in attaining the NAAQS

Section 12.4, Environmental Consequences, discusses the results of the regional air quality analyses and shows that the MVC project would conform to the emission budgets in the State Implementation Plan.

In addition, if a project is located in a non-attainment or maintenance area for carbon monoxide or particulate matter, the project sponsors must meet the requirements of a project-level, "hot-spot" analysis (sometimes called a *microscale* analysis), as part of the project-level conformity determinations, to demonstrate that the project would not cause the NAAQS to be exceeded at the local level. Project-level analyses evaluate localized emissions from the project to demonstrate that the project will not create new violations of the NAAQS,

[1] A transportation plan lists important transportation projects that are planned for the future.

worsen existing violations, or delay attainment of the NAAQS. Project-level analyses use dispersion models (such as CAL3QHC for CO) or qualitative methodologies and guidance published by FHWA for PM_{10} (because there are no accepted quantitative dispersion models for PM_{10}) to demonstrate project-level conformity.

Because Salt Lake City (a maintenance area for CO), Salt Lake County (a non-attainment area for PM_{10}), and Utah County (a non-attainment area for PM_{10}) are non-attainment or maintenance areas, project-level analyses were performed for the proposed MVC alternatives for each of these pollutants in accordance with applicable guidance such as FHWA's Guidance for Preparing and Processing Environmental and Section 4(f) Documents (FHWA 1987), the Transportation Conformity Reference Guide (FHWA 2006a), and the Transportation Conformity Guidance for Qualitative Hot-Spot Analysis in $PM_{2.5}$ and PM_{10} Non-attainment and Maintenance Areas (FHWA 2006b). Section 12.4, Environmental Consequences, discusses the results of the local air quality analyses.

12.2.4 Major Pollutants of Concern for Transportation Projects

The major air pollutants of concern for transportation projects are carbon monoxide (CO), particulate matter (PM_{10} and $PM_{2.5}$), and ozone (O_3).

- **CO**, which is emitted by engines, is a colorless, odorless, poisonous gas that reduces the amount of oxygen carried in the bloodstream by forming carboxyhemoglobin, which prevents oxygenation of the blood. CO is emitted directly into the atmosphere from automobiles with the highest emissions occurring at slow speeds, in stop-and-go traffic, and at colder temperatures. Since it disperses to non-harmful levels fairly rapidly, CO is considered a localized hot-spot pollutant and is the primary pollutant analyzed at the project level.
- **Particulate matter** generally falls into one of two categories: particulate matter with a diameter of 10 microns or less (PM_{10}) or particulate matter with a diameter of 2.5 microns or less ($PM_{2.5}$). The primary source of particulate matter is vehicle emissions. The principal health effects of airborne particulate matter are on the respiratory system.
- **O_3** is a secondary pollutant formed when precursor emissions, nitrogen oxides (NO_x) and volatile organic compounds (VOCs), react in the presence of sunlight. O_3 is a major component of photochemical smog. O_3 irritates the eyes and respiratory tract and increases the risk of respiratory and heart diseases.

12.2.5 Other Pollutants

12.2.5.1 Hazardous Air Pollutants

In addition to the NAAQS, EPA has also established a list of 33 hazardous air pollutants called *urban air toxics* (64 Federal Register 38706). Urban air toxics are pollutants that can cause cancer or other serious health effects. Most air toxics originate from human-made sources, including road mobile sources, non-road mobile sources (such as airplanes), and stationary sources (such as factories or refineries).

Air toxics are in the atmosphere as a result of industrial activities and motor-vehicle emissions. Research has shown that the health risks to people exposed to urban air toxics at sufficiently high concentrations or lengthy durations include an increased risk of cancer, damage to the immune system, and neurological, reproductive, and/or developmental problems (EPA 2000).

To better understand the effects that urban air toxics have on human health, EPA developed a list of 21 mobile-source air toxics (MSATs). Of these 21, EPA identified six as priority pollutants: acetaldehyde, benzene, formaldehyde, diesel exhaust, acrolein, and 1,3-butadiene (66 Federal Register 17230). EPA assessed the risks of various kinds of exposures to these pollutants (FHWA 2006c).

In July 1999, EPA published a strategy to reduce urban air toxics, and, in March 2001, EPA issued regulations for automobile and truck manufacturers to decrease the amounts of these pollutants by target dates in 2007 and 2020. Under the March 2001 regulation, between 1990 and 2020, highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde will be reduced by 67% to 76% and on-highway diesel particulate matter emissions will be reduced by 90%. These reductions will be achieved by implementing source-control programs including the reformulated gasoline program, a new cap on the toxics content of gasoline, the national low-emission vehicle standards, the Tier 2 motor-vehicle emission standards and gasoline sulfur-control requirements, the heavy-duty engine and vehicle standards, and the on-highway diesel fuel sulfur-control requirements (EPA 2000).

In February 2007, EPA issued a final rule to reduce hazardous air pollutants from mobile sources. The final standards will lower emissions of benzene and other air toxics in three ways: (1) by lowering the benzene content in gasoline, (2) by reducing exhaust emissions from passenger vehicles operated at cold temperatures, and (3) by reducing emissions that evaporate from, and permeate through, portable fuel containers.

Under this rule, EPA is requiring that, beginning in 2011, refiners must meet an annual average gasoline benzene content standard of 0.62% by volume on all gasoline (the national benzene content of gasoline today is about 1.0% by volume). In addition, EPA is adopting new standards to reduce non-methane hydrocarbon (NMHC) exhaust emissions from new gasoline-fueled passenger vehicles at colder temperatures below 75 °F (degrees Fahrenheit). Non-methane hydrocarbons include many mobile-source air toxics, such as benzene. Finally, the February 2007 rule establishes standards that will limit hydrocarbon emissions that evaporate or permeate through portable fuel containers such as gas cans.

EPA expects that the new fuel benzene standard and hydrocarbon standards for vehicles and gas cans will together reduce total emissions of mobile-source air toxics by 330,000 tons in 2030, including 61,000 tons of benzene. As a result of this rule, new passenger vehicles will emit 45% less benzene, gas cans will emit 78% less benzene, and gasoline will have 38% less benzene overall.

In addition, the hydrocarbon reductions from the vehicle and gas can standards will reduce volatile organic compound (VOC) emissions (which are precursors to ozone and can be precursors to $PM_{2.5}$) by over 1 million tons in 2030. The vehicle standards will reduce direct $PM_{2.5}$ emissions by 19,000 tons in 2030 and could also reduce secondary formation of $PM_{2.5}$. Once the regulation is fully implemented, EPA estimates that these PM reductions will prevent nearly 900 premature deaths annually.

MSATs are discussed in more detail in the section titled Mobile-Source Air Toxics on page 12-28.

12.2.5.2 Greenhouse Gases

To date, no national standards have been established regarding greenhouse gases, and EPA has not established criteria or thresholds for greenhouse gas emissions. On April 2, 2007, the U.S. Supreme Court issued a decision in *Massachusetts, et al. v. Environmental Protection Agency, et al.* that EPA has the authority under the Clean Air Act to establish motor vehicle emission standards for carbon dioxide (CO_2) emissions. EPA is currently determining the implications to national policies and programs as a result of the Supreme Court's decision. However, the Court's decision does not have direct implications on requirements for developing transportation projects.

FHWA does not believe it is useful at this time to consider greenhouse gas emissions in an Environmental Impact Statement (EIS). The climate impacts of CO_2 emissions are global in nature. Analyzing how alternatives evaluated in an EIS might vary in their relatively small contribution to a global problem will not better inform decisions. Further, due to the interactions between elements of the transportation system as a whole, emissions analyses would be less informative than ones conducted at regional, state, or national levels. Because of these concerns, FHWA concludes that CO_2 emissions cannot be usefully evaluated in this EIS in the same way that other vehicle emissions are addressed.

FHWA is actively engaged in many other activities with the U.S. Department of Transportation Center for Climate Change to develop strategies to reduce the contribution of greenhouse gases from transportation projects, especially CO_2 emissions, and to assess the risks to transportation systems and services from climate change. FHWA will continue to pursue these efforts as productive steps to address this issue. FHWA will review and update its approach to climate change at both the project and policy levels as more information emerges and as policies and legal requirements evolve.

12.3 Affected Environment

12.3.1 Climate

Weather directly influences air quality. Important meteorological factors that affect weather patterns include wind speed and direction, atmospheric stability, temperature, sunlight intensity, and mixing height. The air quality impact analysis area is located along the Wasatch Front at an elevation of about 4,222 feet above sea level. The Great Salt Lake, and to a lesser extent Utah Lake, contribute to weather conditions in both winter and summer. In the winter, the water in the lakes is warmer than the air. This increases the moisture content of the air, which creates the thermal instability that causes “lake effect” storms. As a result, areas surrounding the lakes receive more snowfall than more distant areas. In the summer, the Great Salt Lake has a high evaporation rate, which humidifies the air and causes thunderhead clouds to develop.

The lowest average daily temperatures (28 °F) occur in January, and the highest average daily temperatures (78 °F) occur in July. The highest amount of precipitation generally occurs during April, when the average precipitation is about 2.6 inches. Average annual precipitation is about 15.6 inches. The area receives an annual snowfall of about 63 inches (National Weather Service 1997).

Temperature inversions occur when warmer air overlies cooler air. During temperature inversions, which typically occur between November and February, particulates and CO from wood stoves, fireplaces, and vehicles can be trapped close to the ground, which can lead to violations of the NAAQS. In Salt Lake and Utah County, no-burn days are implemented during inversion periods.

12.3.2 Regional Air Quality Status

The Clean Air Act and its amendments require that all areas with recorded violations of the NAAQS be designated as non-attainment areas. A State Implementation Plan must be developed for non-attainment areas that identifies control strategies for bringing the region back into compliance with the NAAQS. Maintenance areas are areas that were previously non-attainment areas and have subsequently been redesignated as attainment areas.

Table 12.3-1 shows the air quality attainment status for transportation-related pollutants in the air quality impact analysis area.

Table 12.3-1. Air Quality Attainment Status for Transportation-Related Pollutants in the Air Quality Impact Analysis Area

Non-attainment Area	Status	Pollutant
Areas in Salt Lake County		
Salt Lake City	Maintenance area	Carbon monoxide (CO)
Salt Lake County	Maintenance area	1-hour ozone (O_3)[a]
Salt Lake County	Non-attainment area (redesignation to maintenance area is pending)	Particulate matter (PM_{10})
Areas in Utah County		
Provo	Maintenance area	Carbon monoxide (CO)
Utah County	Non-attainment area (redesignation to maintenance area is pending)	Particulate matter (PM_{10})

[a] As of June 15, 2005, EPA revoked the 1-hour ozone standard in all areas except for 8-hour ozone non-attainment Early Action Compact areas. Salt Lake County is not a designated Early Action Compact area; therefore, transportation conformity no longer applies in Salt Lake County.

Source: Utah Division of Air Quality 2006a

As shown in Table 12.3-1, Salt Lake City and Provo are maintenance areas for CO, and both Salt Lake and Utah Counties are non-attainment areas for PM_{10} (with pending redesignations to maintenance areas). In addition, Salt Lake County is a maintenance area for 1-hour ozone (O_3), though transportation conformity no longer applies.

According to the Utah Division of Air Quality (2006c), mobile emission sources (such as cars, trains, and aircraft) and area sources (such as agricultural burning and harvesting, home heating, construction, commercial energy generation, and wildfires) account for about 84% of all PM_{10} emissions and 65% of all CO emissions in the state. Because a large part of the project area in Salt Lake County and Utah County is undeveloped land interspersed with urban development, the air pollutants in the impact analysis area are most likely wind-blown dust and particulates from exposed soils and agricultural tilling practices and vehicle emissions (primarily CO) from traffic on existing highways in the area.

The Utah Division of Air Quality maintains a network of air quality monitoring stations throughout the state. In general, these monitoring stations are located where there are known air quality problems, so they are usually in or near urban areas or close to specific emission sources. Other stations are located in remote areas to provide an indication of regional air pollution levels.

Table 12.3-2 through Table 12.3-4 below show monitoring results for transportation-related criteria pollutants from 2001 through 2005 at the monitoring stations in Salt Lake and Utah Counties. The monitoring results show that, in general, air quality is improving along the Wasatch Front.

On December 18, 2006, EPA revised the 24-hour $PM_{2.5}$ standard from 65 $\mu g/m^3$ (micrograms per cubic meter) to 35 $\mu g/m^3$. An area will meet the revised 24-hour standard if the 98th percentile of 24-hour $PM_{2.5}$ concentrations in a year (averaged over 3 years) is less than or equal to the 35 $\mu g/m^3$ standard. By December 2007, the State of Utah will make recommendations for areas to be designated attainment (meeting the standard) and non-attainment (exceeding the standard). EPA intends to make official attainment and non-attainment designations by December 2009, and those designations would become effective in April 2010.

It is anticipated that portions of Salt Lake and Utah Counties will be designated as non-attainment areas under the revised $PM_{2.5}$ standard (Utah Division of Air Quality 2006b). If these areas are designated as non-attainment areas for $PM_{2.5}$, WFRC and MAG will need to demonstrate that projects such as the MVC meet the $PM_{2.5}$ project-level conformity requirements 1 year after the effective date of non-attainment designations (that is, they are included in a conforming long-range transportation plan and Transportation Improvement Program and they have met the hot-spot requirements).

Table 12.3-2. Summary of CO Monitoring Data for Salt Lake and Utah Counties

Station	Parameter	2001	2002	2003	2004	2005
Salt Lake County						
Hawthorne (1675 South 600 East, Salt Lake City)	Peak 1-hour value (ppm)[a]	8.9	6.3	8.7	6.3	5.8
	Peak 8-hour value (ppm)[b]	4.7	3.7	4.3	3.5	3.8
	Days above standard	0	0	0	0	0
Cottonwood (5715 South 1400 East, Salt Lake City)	Peak 1-hour value (ppm)	5.6	5.0	5.8	4.5	3.9
	Peak 8-hour value (ppm)	3.8	3.5	3.2	2.3	2.6
	Days above standard	0	0	0	0	0
West Valley City (3275 West 3100 South, West Valley City)	Peak 1-hour value (ppm)	6.7	6.0	7.1	5.9	5.4
	Peak 8-hour value (ppm)	4.7	4.3	5.2	4.0	4.3
	Days above standard	0	0	0	0	0
Utah County						
North Provo (1355 North 200 West, Provo)	Peak 1-hour value (ppm)	6.3	5.1	4.9	3.3	3.9
	Peak 8-hour value (ppm)	4.4	3.6	3.0	2.7	2.7
	Days above standard	0	0	0	0	0
University Avenue (363 N. University Avenue, Provo)	Peak 1-hour value (ppm)	10.1	6.9	6.9	5.4	4.9
	Peak 8-hour value (ppm)	7.5	5.0	4.1	3.6	3.2
	Days above standard	0	0	0	0	0

[a] 1-hour CO standard = 35 ppm

[b] 8-hour CO standard = 9 ppm

Source: EPA 2007a

Table 12.3-3. Summary of PM_{10} Monitoring Data for Salt Lake and Utah Counties

Station	Parameter	2001	2002	2003	2004	2005
Salt Lake County						
Cottonwood (5715 South 1400 East, Holladay)	Annual average (µg/m^3)[a]	32	32	28	32	27
	Peak 24-hour value (µg/m^3)[b]	104	119	92	145	114
	Days above standard	0	0	0	0	0
Hawthorne (1675 South 600 East, Salt Lake City)	Annual average (µg/m^3)	30	29	26	29	24
	Peak 24-hour value (µg/m^3)	105	130	360	129	139
	Days above standard	0	0	2	0	0
Magna (2935 South 8560 West, Magna)	Annual average (µg/m^3)	25	25	26	24	22
	Peak 24-hour value (µg/m^3)	201	87	421	88	177
	Days above standard	2	0	1	0	1
North Salt Lake (1795 North 1000 West, Salt Lake City)	Annual average (µg/m^3)	44	41	40	42	37
	Peak 24-hour value (µg/m^3)	153	121	358	189	153
	Days above standard	0	0	3	1	0
Utah County						
Lindon (50 N. Main Street, Lindon)	Annual average (µg/m^3)	34	32	25	29	25
	Peak 24-hour value (µg/m^3)	111	288	150	159	86
	Days above standard	0	1	0	1	0
North Provo (1355 North 200 West, Provo)	Annual average (µg/m^3)	29	29	23	25	21
	Peak 24-hour value (µg/m^3)	95	82	76	100	68
	Days above standard	0	0	0	0	0

[a] Annual PM_{10} standard = 50 µg/m^3 (annual standard revoked by EPA on December 18, 2006)

[b] 24-hour PM_{10} standard = 150 µg/m^3 (standard allows for three exceedances over a 3-year period)

Source: EPA 2007a

Table 12.3-4. Summary of $PM_{2.5}$ Monitoring Data for Salt Lake and Utah Counties

Station	Parameter	2001	2002	2003	2004	2005
Salt Lake County						
Cottonwood (5715 South 1400 East, Holladay)	Annual average (ppm)[a]	13.2	14.1	10.5	14.3	11.1
	Peak 24-hour value (ppm)[b]	77	84	57	69	63
	(98th percentile)	(68)	(65)	(32)	(66)	(42)
Herriman (5600 West 12950 South, Herriman)	Annual average (ppm)	13.3	8.3	7.0	10.9	7.8
	Peak 24-hour value (ppm)	69	60	28	62	40
	(98th percentile)	(69)	(38)	(25)	(48)	(27)
Hawthorne (1675 South 600 East, Salt Lake City)	Annual average (ppm)	12.4	12.7	9.6	14.2	11.0
	Peak 24-hour value (ppm)	81	90	60	94	61
	(98th percentile)	(66)	(56)	(34)	(64)	(43)
North Salt Lake (1795 North 1000 West, Salt Lake City)	Annual average (ppm)	14.1	15.5	12.3	17.8	14.1
	Peak 24-hour value (ppm)	67	92	55	86	63
	(98th percentile)	(58)	(56)	(46)	(57)	(44)
West Valley City (3275 West 3100 South, West Valley City)	Annual average (ppm)	12.9	13.4	11.1	13.9	12.0
	Peak 24-hour value (ppm)	67	86	55	74	63
	(98th percentile)	(60)	(58)	(45)	(61)	(40)
Utah County						
Highland (10865 North 6000 West, Provo)	Annual average (ppm)	10.2	9.1	7.1	10.7	8.1
	Peak 24-hour value (ppm)	73	47	36	75	43
	(98th percentile)	(54)	(30)	(23)	(50)	(34)
Lindon (30 N. Main Street, Lindon)	Annual average (ppm)	11.6	10.9	8.6	12.8	10.0
	Peak 24-hour value (ppm)	78	66	61	82	60
	(98th percentile)	(61)	(43)	(29)	(64)	(37)
North Provo (1355 North 200 West, Provo)	Annual average (ppm)	11.8	11.6	9.2	11.1	9.8
	Peak 24-hour value (ppm)	83	58	42	67	46
	(98th percentile)	(49)	(40)	(28)	(54)	(36)

From 2001 to 2004, the 24-hour $PM_{2.5}$ standard was 65 $\mu g/m^3$. This was revised to 35 $\mu g/m^3$ in 2005.

Nearly all Wasatch Front monitoring sites in Salt Lake and Utah Counties would show a violation of the revised 24-hour $PM_{2.5}$ standard.

[a] Annual $PM_{2.5}$ standard = 15 $\mu g/m^3$

[b] 24-hour $PM_{2.5}$ standard = 35 $\mu g/m^3$; violations determined from 98th-percentile concentrations

Source: EPA 2007a

12.4 Environmental Consequences

This section describes the air quality impacts associated with the Mountain View Corridor. Air quality impacts were evaluated using guidelines and procedures from EPA, FHWA, and the Utah Department of Transportation (UDOT). The impacts of construction activities would be temporary and are discussed in Chapter 21, Construction Impacts. The operational impacts of the MVC alternatives would be long-term and would be directly due to the operation of transit vehicles on 5600 West and freeway traffic and vehicle speeds on the roadway alternatives. Section 12.2.4, Major Pollutants of Concern for Transportation Projects, describes the criteria pollutants that were evaluated in this EIS.

12.4.1 Methodology

The FHWA publication *Guidance for Preparing and Processing Environmental and Section 4(f) Documents* (FHWA 1987) identifies the requirements for evaluating air quality impacts associated with transportation projects and provides guidance on completing mesoscale and microscale air quality evaluations.

Mesoscale evaluations look at regional air quality impacts and are typically conducted by the local metropolitan planning organization. For the proposed MVC project, the metropolitan planning organizations responsible for completing the mesoscale evaluations are WFRC in Salt Lake County and MAG in Utah County. *Microscale evaluations* look at localized (hot-spot) air quality impacts, primarily at the road or intersection level. The mesoscale and microscale air quality evaluations were used to determine whether the MVC project would cause the NAAQS to be exceeded and would conform to the approved State Implementation Plans.

In addition, FHWA's Easy Mobile Inventory Tool (EMIT) was used to develop *emission estimates* of transportation-related MSATs in the air quality impact analysis area for each of the proposed alternatives.

Each of these evaluations is described in more detail below.

12.4.1.1 Mesoscale Evaluations for Regional Air Quality

Regional conformity analyses are conducted by the appropriate metropolitan planning organization (in this case, WFRC for Salt Lake County and MAG for Utah County) as part of the conformity determinations of the transportation plans and transportation improvement programs. Both WFRC and MAG have included the MVC project as a "regionally significant" project in their most recent transportation conformity analyses.

Salt Lake County. The most recent mesoscale evaluation for Salt Lake County is the *Conformity Analysis for the WFRC 2030 Regional Transportation Plan* (WFRC 2007). This conformity analysis found that the regionally significant transportation projects included in the analysis would conform to the CO and PM_{10} emission budgets in the State Implementation Plan. The plan included the 5800 West Freeway Alternative and was approved by FHWA on June 27, 2007.

Utah County. The most recent mesoscale evaluation for Utah County is the *Conformity Determination Report: Mountainland MPO [Metropolitan Planning Organization] 2030 Regional Transportation Plan* (MAG 2007). This conformity analysis found that the regionally significant projects included in the analysis would conform to the PM_{10} emission budgets in the State Implementation Plan. The plan included a freeway alignment for the Mountain View Corridor project alternative (a north-south alignment from the Salt Lake County line to SR 73) (Regional Transportation Plan Project No. 12) and an east-west alignment from Saratoga Springs to Lehi (Regional Transportation Plan Project No. 13). The conformity determination for the MAG 2030 Regional Transportation Plan was approved by FHWA on June 27, 2007.

12.4.1.2 Microscale Evaluations for Local Air Quality (CO and PM_{10})

For the MVC project, a microscale (hot-spot) analysis was conducted for CO and PM_{10}. Final project-level conformity determinations for the MVC preferred alternative will be made before the Record of Decision for the project is issued.

Carbon Monoxide (CO) Methodology

To comply with air quality conformity requirements in non-attainment or maintenance areas for CO, a microscale (hot-spot) analysis is required. FHWA and UDOT determined that a project-level CO analysis would be conducted at the following two locations in the air quality impact analysis area:

- The 1300 South/5800 West interchange (in the Salt Lake City CO maintenance area between I-80 and SR 201)
- The 9000 South/5800 West interchange (the interchange in the project corridor with the highest traffic volume outside the Salt Lake City CO maintenance area)

With the exception of the freeway segment from I-80 to SR 201, the mainline traffic volumes on the 5800 West Freeway Alternative would be higher than those on the 7200 West Freeway Alternative and would be higher than those on all of the Utah County alternatives (see Table 12.4-1 below). For this reason, detailed modeling was required for interchanges on the 5800 West Freeway

Alternative only. This analysis assumes that, if the NAAQS for CO would not be exceeded at the highest-volume interchanges on the 5800 West Freeway Alternative, then the CO concentrations along the 7200 West Freeway Alternative and the Utah County alternatives would likewise not be exceeded because these alternatives have lower traffic volumes.

Table 12.4-1. Average Daily Traffic Volumes for the Salt Lake County Roadway Alternatives in 2030

MVC Segment	5800 West Freeway Alternative (with tolling)	7200 West Freeway Alternative (with tolling)
I-80 to SR 201	51,000 (20,000)	56,000 (22,000)
SR 201 to 13400 South	158,000 (60,000)	147,000 (51,000)
13400 South to Utah County line	113,000 (29,000)	112,000 (28,000)

CO impacts were evaluated using the CAL3QHC line source dispersion model. The CAL3QHC model uses free-flow and idling vehicle emission rates in conjunction with roadway geometry, wind direction, and other meteorological factors to estimate 1-hour CO concentrations at receptor locations near the roadway. Eight-hour CO concentrations were estimated by applying a persistence factor of 0.7 to 1-hour concentrations using procedures recommended by EPA.

Consistent with recommendations included in UDOT's *Air Quality Hot-Spot Manual* (UDOT 2003), the critical assumptions and configuration parameters used in the modeling included a 1,000-meter mixing height, low wind speed (1 meter per second), and 2030 1-hour and 8-hour background CO concentrations of 4.7 ppm and 2.8 ppm, respectively. In addition, the modeling assumed a very stable (Class E) atmosphere to simulate adverse wintertime air quality conditions when CO violations are more likely to occur. The modeling evaluated 36 wind directions to ensure that the worst-case CO concentration was determined for each receptor location. Interchange configurations and traffic movements, as well as traffic volumes and travel speeds, were derived from the traffic models. Vehicle emission rates were obtained from UDOT's *Air Quality Hot-Spot Manual* (UDOT 2003) and are more conservative (that is, higher) than those used by WFRC and MAG for regional modeling, an approach that results in worst-case emission estimates. Estimated CO concentrations under worst-case meteorological conditions represent the highest CO levels that could result from vehicle emissions.

Receptors are locations where the maximum total CO concentration is likely to occur and where the general public is likely to have continuous access and exposure to vehicle emissions. For the Mountain View Corridor project, most individual exposure to vehicle emissions would be at locations adjacent to the roadway, including the freeway mainline and interchange ramp intersections (for example, sidewalks) where people would be likely to spend more time. For each of the two modeled interchanges, 34 to 38 receptors were included in the model (including mainline segments). The results of this analysis are shown in Section 12.4.3.2, 5800 West Freeway Alternative.

Particulate Matter (PM) Methodology

***PM_{10}*.** There are currently no EPA-approved quantitative methods for analyzing PM_{10} emissions. Therefore, this chapter qualitatively describes PM_{10} impacts from the MVC project. PM_{10} comes from direct PM_{10} sources such as dust that is stirred up by vehicle tires as well as secondary reactions of NO_x and sulfur oxides (SO_x) that form PM_{10} in the atmosphere. The qualitative analysis was conducted by (1) comparing average daily traffic volumes in the air quality impact analysis area to those on Interstate 15 (I-15) in North Salt Lake, and (2) reviewing air quality monitoring data adjacent to I-15 in North Salt Lake to determine if similar traffic volumes on the Mountain View Corridor would be likely to cause the NAAQS for PM_{10} to be exceeded.

***$PM_{2.5}$*.** Under the transportation conformity rule, $PM_{2.5}$ hot-spot analyses are required for "projects of air quality concern." A new highway project could be considered a "project of air quality concern" if it is expected to carry traffic volumes of 125,000 vehicles per day, with 8% or more truck traffic (that is, 10,000 trucks per day). If the MVC is implemented as a non-tolled roadway, some segments of the MVC would likely exceed this threshold, including both the 5800 West Freeway and 7200 West Freeway Alternatives from SR 201 to 13400 South (see Table 12.4-1 above, Average Daily Traffic Volumes for the Salt Lake County Roadway Alternatives in 2030), the 2100 North Freeway Alternative between Redwood Road and I-15 (daily volume of 148,000), and the Southern Freeway Alternative between Porter Rockwell Boulevard and 2100 North (daily volume of 129,000).

A project-level conformity determination is required for the first federal approval action after the 1-year grace period for new non-attainment areas expires, which is expected to be in April 2011 for $PM_{2.5}$ (project-level conformity requirements already apply in the MVC project area for CO and PM_{10}, and the Record of Decision for the MVC will include a project-level conformity determination for these two pollutants). Since additional federal approvals for this project are expected after April 2011, conformity will eventually apply to this project (assuming that the area is designated non-attainment for $PM_{2.5}$), and the U.S. Department of Transportation will comply with whatever $PM_{2.5}$ conformity requirements apply at that time.

Even though transportation conformity does not currently apply for $PM_{2.5}$, and the U.S. Department of Transportation will not be making a conformity determination for $PM_{2.5}$ as part of this EIS, the following discussion generally follows the approach described in the March 29, 2006 EPA and FHWA guidance, *Transportation Conformity Guidance for Qualitative Hot-spot Analysis in $PM_{2.5}$ and PM_{10} Non-attainment and Maintenance Areas*. At this point, FHWA has not released guidance on how to address the revised $PM_{2.5}$ standard in NEPA documents.

12.4.1.3 Emissions Methodology for Criteria Pollutants and Mobile-Source Air Toxics

Criteria pollutant emissions associated with the Mountain View Corridor were provided by WFRC and MAG based on regional modeling conducted by those agencies using traffic data specific to the Mountain View Corridor project. FHWA's Easy Mobile Inventory Tool modeling program was used to derive annual estimates of MSATs associated with the Mountain View Corridor project alternatives.

The traffic data used in the MSAT analyses were taken from the regional travel demand model used in the transportation analysis. That data included link distances and geometry, lane capacity, average daily traffic, and travel speeds for major freeways, collectors, and principal arterials in Salt Lake and Utah Counties. The WFRC input parameters for the regional conformity analysis, such as the distribution of vehicle ages, inspection-maintenance parameters, and local fuel parameters, were also used in the model.

12.4.2 No-Action Alternative

12.4.2.1 Regional Air Quality

Under the No-Action Alternative, the Mountain View Corridor project would not be built. However, other regionally significant transportation projects identified in the WFRC and MAG long-range plans and by the local communities would be constructed, and these projects would contribute to localized CO and PM_{10} air quality impacts throughout the area.

The most recent transportation conformity analyses conducted for the Salt Lake County and Utah County non-attainment and/or maintenance areas indicate that, in 2030 with all regionally significant transportation projects in UDOT's regional transportation plan (including the MVC) constructed, both counties would be within the CO and PM_{10} emission budgets established in the State Implementation Plan (WFRC 2007; MAG 2007). More than 50% of the CO and PM_{10} emission budgets (the allowed level of emissions for each type of pollutant) in the State Implementation Plan would remain in 2030 if all regionally significant projects are completed. As a result, the No-Action Alternative (which includes all of these regionally significant projects minus the MVC) would not result in new violations of the NAAQS, increase the frequency or severity of existing violations of the NAAQS, or delay the attainment of the NAAQS for the criteria pollutants of concern for the microscale evaluation (CO and PM_{10}).

12.4.3 Salt Lake County Alternatives

In Salt Lake County, two roadway alternatives and a transit alternative which would be implemented as part of the roadway alternatives are under consideration: the 5600 West Transit Alternative, the 5800 West Freeway Alternative, and the 7200 West Freeway Alternative. Under the 5600 West Transit Alternative, there is a dedicated right-of-way option and a mixed-traffic option. In addition, a tolling option was considered for each freeway alternative. Impacts under each combination of alternatives and options are discussed in the following sections.

12.4.3.1 5600 West Transit Alternative (Both Options)

As described in Chapter 2, Alternatives, two transit options are under consideration along 5600 West in Salt Lake County. One option, the Dedicated Right-of-Way Option, would incorporate a transit system running down the center of the roadway, and the other, the Mixed-Traffic Option, would incorporate a transit system running alongside the roadway. The air quality impacts from either transit option would be similar and are combined for this section.

Regional Air Quality

The Mountain View Corridor project is included in the most recent regional transportation conformity analysis for Salt Lake County (see Section 12.4.1.1, Mesoscale Evaluations for Regional Air Quality). In that 2030 analysis, all regionally significant transportation and transit projects were determined to be in compliance with the CO and PM_{10} emission budgets in the State Implementation Plan with more than 50% of the emissions budget remaining in 2030 following construction of all regionally significant projects, including the MVC. The MVC would increase regional CO and PM_{10} emissions by about 3% and less than 1%, respectively, in 2030 compared to the No-Action Alternative without the MVC (see Table 12.4-5, Regional Mesoscale Air Quality with the Salt Lake County Roadway Alternatives in 2030, on page 12-27). Under these conditions, the 5600 West Transit Alternative would be a relatively minor source of CO and PM_{10} at the regional level.

Local Air Quality (CO and PM_{10})

Depending on the freeway alternative that is implemented, average daily traffic volumes in 2030 on 5600 West would range from 15,700 to 27,500 vehicles per day (with the 5800 West Freeway Alternative) to 23,900 to 37,400 vehicles per day (with the 7200 West Freeway Alternative). A transit system under either option would be a minor source of CO and PM_{10} emissions at the local level compared to vehicle-generated emissions.

Mobile-Source Air Toxics

Similar to criteria pollutant emissions, MSAT emissions are proportional to traffic volumes and vehicle-miles traveled. A transit system would be a minor source of MSATs compared to vehicle-generated emissions on 5600 West.

The vehicle-miles traveled in the impact analysis area under the MVC alternatives range from about 13 million miles per day to 14.7 million miles per day, and the vehicle-miles traveled on 5600 West make up less than 2% of this total. The MSAT emissions associated with a transit alternative would make up a small component of overall regional MSAT emissions.

12.4.3.2 5800 West Freeway Alternative

As described in Chapter 2, Alternatives, this alternative would consist of a freeway extending from I-80 to the Utah County line.

Regional Air Quality

The Mountain View Corridor project is included in the most recent regional transportation conformity analysis for both Salt Lake County and Utah County (see Section 12.4.1.1, Mesoscale Evaluations for Regional Air Quality). For Salt Lake County, WFRC's most recent plan includes the 5800 West Freeway Alternative. For Utah County, the most recent plan includes a north-south freeway alignment from the Salt Lake County line to SR 73 and an east-west alignment from Saratoga Springs to Lehi. In that 2030 analysis, all regionally significant transportation and transit projects were determined to be in compliance with the CO and PM_{10} emission budgets in the State Implementation Plan with more than 50% of the regional emissions budget remaining in 2030. The MVC would increase regional CO and PM_{10} emissions by about 3% and less than 1%, respectively, in 2030 compared to the No-Action Alternative without the MVC (see Table 12.4-5, Regional Mesoscale Air Quality with the Salt Lake County Roadway Alternatives in 2030, on page 12-27). Under these conditions, the 5800 West Freeway Alternative would not be a substantial source of CO and PM_{10} at the regional level.

Local Air Quality (CO)

The local CO impacts described below are operational impacts that would occur after the Mountain View Corridor project is completed. The highest modeled CO concentrations associated with the MVC project are shown in Table 12.4-2.

Table 12.4-2. Highest Modeled Concentrations of Carbon Monoxide along the MVC

	1-Hour Concentration (ppm)			8-Hour Concentration (ppm)		
Roadway Segment or Interchange	Existing Conditions[a]	5800 West Freeway Alternative (2030)[b]	NAAQS	Existing Conditions[a]	5800 West Freeway Alternative (2030)[c]	NAAQS
1300 South/5800 West interchange (southbound on ramp to MVC)	4.7	9.9[d]	35	2.8	6.4[d]	9
1300 South/5800 West (MVC mainline)	4.7	9.5[d]	35	2.8	6.2[d]	9
9000 South/5800 West interchange (northbound off ramp to 9000 South)	4.7	12.9[d]	35	2.8	8.5[d]	9
9000 South/5800 West (MVC mainline)	4.7	13.3[d]	35	2.8	8.8[d]	9

ppm = parts per million

[a] Under the existing conditions, the Mountain View Corridor has not been built. There are currently no vehicle emissions associated with the MVC at these locations. The 1-hour and 8-hour concentrations are average background concentrations from air quality monitors near the proposed alignment.

[b] Includes 1-hour background concentration of 4.7 ppm.

[c] Includes 8-hour background concentration of 2.8 ppm.

[d] Highest modeled CO concentration shown for all scenarios.

1300 South/5800 West Interchange. Under the 5800 West Freeway Alternative, the highest modeled 1-hour CO concentration at the 1300 South/5800 West interchange (in the Salt Lake City CO maintenance area) was 9.9 ppm, which was below the 1-hour NAAQS of 35 ppm. The highest modeled CO concentration was adjacent to the southbound on ramp to the Mountain View Corridor mainline. The highest modeled 8-hour concentration at the 1300 South/5800 West interchange was 6.4 ppm, which was below the 8-hour NAAQS of 9 ppm.

1300 South/5800 West Mainline. Under the 5800 West Freeway Alternative, the highest modeled 1-hour CO concentration on the Mountain View Corridor mainline near the 1300 South/5800 West mainline was 9.5 ppm, which was below the 1-hour NAAQS of 35 ppm. The highest modeled 8-hour concentration on the mainline was 6.2 ppm, which was below the 8-hour NAAQS of 9 ppm.

It is unlikely that people would spend extended periods of time (for example, 8 hours) standing adjacent to the Mountain View Corridor mainline or standing adjacent to the interchange on and off ramps, so the actual concentrations of CO that people would be exposed to would likely be much lower.

Detailed CO modeling for the 1300 South/5800 West interchange and freeway mainline indicate that CO concentrations would be below the NAAQS for both the 1-hour and 8-hour CO standards. Historical data from regional monitoring stations also indicate that CO emissions are decreasing throughout the region, despite an increase in population and vehicle-miles traveled. No localized CO impacts are expected in the Salt Lake City CO maintenance area.

9000 South/5800 West Interchange. Under the 5800 West Freeway Alternative, the highest modeled 1-hour CO concentration at the 9000 South/5800 West interchange was 12.9 ppm, which was below the 1-hour NAAQS of 35 ppm. The highest modeled CO concentration at this interchange was located adjacent to the northbound off ramp to 9000 South. The highest modeled 8-hour concentration at this interchange was 8.5 ppm, which was below the 8-hour NAAQS of 9 ppm.

9000 South/5800 West Mainline. Under the 5800 West Freeway Alternative, the highest modeled 1-hour CO concentration on the Mountain View Corridor mainline near the 9000 South/5800 West mainline was 13.3 ppm, which was below the 1-hour NAAQS of 35 ppm. The highest modeled 8-hour concentration on the mainline was 8.8 ppm, which was below the 8-hour NAAQS of 9 ppm.

Detailed CO modeling for the 9000 South/5800 West interchange and mainline indicate that CO concentrations would be below the NAAQS for both the 1-hour and 8-hour CO standards. Historical data also indicate that CO emissions are decreasing throughout the region, despite an increase in population and vehicle-miles traveled. No localized CO impacts are expected in the air quality impact analysis area.

Local Air Quality (PM_{10})

PM_{10} concentrations in the environment come from direct sources such as dust stirred up by vehicle tires as well as secondary reactions of NO_x and SO_x that form PM_{10} in the atmosphere. Traffic volumes and the corresponding traffic congestion have less of an impact on PM_{10} concentrations than do the larger regional trends in emission rates and industrial pollution controls (UDOT 2003). Therefore, PM_{10} in Salt Lake and Utah County will likely remain a regional issue related to prolonged temperature inversions and a gradual build-up of PM_{10}-related pollutants.

In the 2030 regional conformity analysis, all regionally significant transportation and transit projects were determined to be in compliance with the PM_{10} emission budgets in the State Implementation Plan with more than 50% of the regional emissions budget remaining in 2030. Regional emissions are shown in Table 12.4-5, Regional Mesoscale Air Quality with the Salt Lake County Roadway Alternatives in 2030, on page 12-27.

Emission Sources of PM_{10}

There are two categories of particulate emissions from transportation sources: primary and secondary.

- **Primary particulate emissions** are those emitted from vehicle tailpipes, brake wear, decomposition of rubber tires, and road dust stirred up by moving vehicles.
- **Secondary particulate emissions** result from chemical reactions in the atmosphere and include SO_x and NO_x that are emitted from vehicle tailpipes as gaseous pollutants.

Due to the geography along the Wasatch Front, atmospheric inversions are relatively common during the winter when cold air is trapped near the ground for several days. Under these conditions, air pollutants are trapped close to the ground and are prevented from dispersing.

Project-Related PM_{10} Emissions

PM_{10} emissions from construction activities are usually localized and short-term and last only for the duration of the construction period. Construction emissions are minimized through good construction practices such as watering exposed surfaces, minimizing the amount of exposed and disturbed surfaces, minimizing construction equipment and vehicle speeds, and properly maintaining vehicle engines.

PM_{10} monitors are generally located in or near areas with known PM_{10} problems. The nearest PM_{10} monitors to the proposed Mountain View Corridor alignments are in Magna (about 2 miles west of the 7200 West Freeway Alternative) and in Lindon (about 2.5 miles east of I-15). Neither of these monitors is close to a high-volume road such as the Mountain View Corridor would be. However, the monitoring station in North Salt Lake is located about 350 feet from I-15 and reflects PM_{10} contributions from high-volume roads as well as several industrial facilities nearby.

For this analysis, the North Salt Lake monitor was used as a surrogate for PM_{10} contributions from the Mountain View Corridor. Ambient PM_{10} monitoring data for the North Salt Lake monitor (as well as those in Magna and Lindon) are shown in Table 12.4-3 below. As shown in the table, there have been no violations of the annual PM_{10} standard at the North Salt Lake monitor since 2000, and the annual average PM_{10} concentrations have declined over the same period.

Table 12.4-3. PM_{10} Monitoring Data for Salt Lake and Utah Counties

Year	Annual Average (μg/m³)	Number of Annual Exceedances[a]	24-hour High (μg/m³)	Number of 24-Hour Exceedances[b]
North Salt Lake – Davis County				
2000	46	0	118	0
2001	44	0	153	0
2002	41	0	121	0
2003	40	0	358	3
2004	42	0	189	1
2005	37	0	153	0
2006	36	0	124	0
Magna – Salt Lake County				
2000	23	0	55	0
2001	25	0	201	2
2002	25	0	87	0
2003	26	0	421	1
2004	24	0	88	0
2005	22	0	177	1
2006	17	0	80	0
Lindon – Utah County				
2000	32	0	94	0
2001	34	0	111	0
2002	32	0	288	1
2003	25	0	150	0
2004	29	0	159	1
2005	25	0	86	0
2006	22	0	116	0

[a] The annual standard is attained if the 3-year average of individual annual averages is less than 50 μg/m³. Three consecutive years of PM_{10} monitoring data must show that violations of the 24-hour and annual standard are no longer occurring in order for an area to be considered to be attaining the NAAQS.

[b] The 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 μg/m³ is equal to or less than one. Each monitoring site is allowed up to three expected exceedances of the 24-hour standard within a period of 3 calendar years. More than three expected exceedances in that 3-year period is a violation of the NAAQS.

There were three days in 2003 (February 1, April 1, and April 2), one day in 2004 (May 10), and one day in 2005 (September 10) when the 24-hour standard was exceeded due to unusually high winds. In each instance, the Salt Lake Valley experienced very dusty winds because a dry weather front passed through the area, and elevated concentrations of PM_{10} were observed at other monitoring locations throughout the region. These events have been described in the PM_{10} maintenance plan as natural events for which regional control measures are not expected to work (Utah Air Quality Board 2005). Such unusual weather events are not indicators of overall air quality trends in the region.

According to Utah traffic volume data, average annual daily traffic volumes on I-15 near the North Salt Lake monitoring station have increased from about 99,700 vehicles per day (vpd) in 2000 to more than 127,700 vpd in 2005, an increase of more than 28% (UDOT 2005).

Combined with the data in Table 12.4-3 above, this information shows that, as the annual traffic volumes have increased, average annual PM_{10} concentrations have declined at an air monitor close to the freeway.

Table 12.4-4 shows the average daily traffic volumes for individual segments of the Mountain View Corridor in 2030 and difference in traffic compared to the I-15 segment nearest to the North Salt Lake monitoring station. As shown in Table 12.4-4, two of the three MVC segments in Salt Lake County would have less traffic than I-15 adjacent to the North Salt Lake monitoring station.

Table 12.4-4. Comparison of Average Daily Traffic on the 5800 West Freeway Alternative and I-15 in North Salt Lake

MVC Segment	Average Daily Traffic on MVC Segment in 2030 (vpd)	Percent Change from Average Daily Traffic on I-15 in 2005[a]
I-80 to SR 201	51,000	–59.8%
SR 201 to 13400 South	158,000	+24.4%
13400 South to Utah County line	113,000	–11.0%

[a] Traffic on I-15 in 2005 was 127,000 vehicles per day.

The average daily traffic volume on the Mountain View Corridor between SR 201 and 13400 South would be about 24% higher than the recorded volume on I-15 in 2005. Nonetheless, the increased traffic volumes on this segment of the MVC are not expected to cause or contribute to a new PM_{10} violation, or increase the frequency or severity of existing violations, for the following reasons:

- Traffic volumes on I-15 increased by more than 28% between 2000 and 2005, but the average annual PM_{10} concentration decreased by nearly 22% during this period. It is expected that the MVC would have similar or less truck traffic volumes than I-15.
- Land uses near the North Salt Lake monitoring station are more intense than in other parts of the Salt Lake Valley and include several oil refineries, a sand and gravel quarry, and other industrial land uses that are not present near the MVC. As shown in Table 12.4-5, Regional Mesoscale Air Quality with the Salt Lake County Roadway Alternatives in 2030, and Table 12.4-9, Regional Mesoscale Air Quality with the Utah County Alternatives in 2030, below, regional PM_{10} emissions decrease by about 43% and 53% in Salt Lake County and Utah County, respectively, between existing conditions and the No-Action Alternative.
- Regional conformity emissions modeling by WFRC and MAG indicates that air quality will continue to improve in the future.
- Vehicles are expected to emit less PM_{10} in the future. WFRC regional modeling shows that emission rates for most PM_{10} constituents would decrease by substantially more than 50% between now and 2030.

Despite the evidence discussed above suggesting that PM_{10} emissions would not be an issue for the Mountain View Corridor, there are no assurances that land uses (that is, the mix of commercial, residential, and industrial emission sources) in the vicinity of the project area would be sufficiently similar to those in the vicinity of the North Salt Lake monitoring station to ensure this outcome.

Regional Mesoscale Air Quality with the 5800 West Freeway Alternative in 2030

Table 12.4-5 below shows the pollutant emissions expected from the Salt Lake County alternatives for those pollutants for which the county is either a non-attainment area or maintenance area (PM_{10} and its precursors, NO_x). The vehicle-miles traveled in the region under the 5800 West Freeway Alternative would be about 38.6 million miles per day, or an increase of about 1.3 million miles per day over the No-Action Alternative. The total regional emissions of criteria pollutants under the 5800 West Freeway Alternative would be about 47.31 tons per day, an increase of about 0.21 ton per day over the No-Action Alternative.

Table 12.4-5. Regional Mesoscale Air Quality with the Salt Lake County Roadway Alternatives in 2030

		No-Action Alternative		5800 West Alternative		7200 West Alternative	
Parameter	**Existing Conditions (2006)**	**Alternative**	**Percent Change from Existing Conditions**	**Alternative (with tolling)**	**Percent Change from No-Action (with tolling)**	**Alternative (with tolling)**	**Percent Change from No-Action (with tolling)**
VMT (million miles/day)	23.4	37.3	59.4%	38.6 (38.0)	3.49% (1.88%)	38.4 (38.0)	2.95% (1.88%)
CO (tons/day)	627.8	215.1	–65.7%	221.9 (217.3)	3.16% (1.00%)	221.5 (217.0)	3.00% (0.88%)
Particulate Matter							
NO_x (tons/day)[a]	58.24	9.52	–83.7%	9.83 (9.66)	3.26% (1.47%)	9.80 (9.64)	2.94% (1.26%)
Direct PM (tons/day)	1.24	1.20	–3.2%	1.23 (1.21)	2.50% (0.83%)	1.23 (1.21)	2.50% (0.83%)
Fugitive dust (tons/day)	22.6	36.38	61.0%	36.25 (36.68)	–0.36% (0.82%)	36.26 (36.71)	–0.33% (–0.91%)
Total PM emissions (tons/day)	82.1	47.10	–42.6%	47.31 (47.55)	0.45% (0.96%)	47.29 (47.56)	0.40% (0.98%)

[a] NO_x to PM_{10} conversion is not 100%. Therefore, NO_x overestimates total PM_{10} emissions.

Source: WFRC 2007

$PM_{2.5}$

Localized Impacts. Vehicle emission rates are expected to decline by about 59% between 2005 and the expected project opening year of 2015, with an additional 25% reduction between 2015 and 2030. In other words, assuming the same national average ratio of light- and heavy-duty vehicles, 100,000 vehicles in 2005 would have the same $PM_{2.5}$ emissions as 244,000 vehicles in 2015 or 326,000 vehicles in 2030. Since diesel vehicles are the primary source of mobile-source particulate matter, the transportation conformity rule places special emphasis on projects with a significant volume of diesel vehicles. EPA's MOBILE6.2 emissions model predicts that, relative to 2005, diesel particulate emissions rates will decline by 80% by 2015 and 95% by 2030. That is, 100,000 vehicles in 2005 would have the same diesel particulate emissions as 500,000 vehicles in 2015 or 2,000,000 vehicles in 2030.

The relative contribution of regional and localized sources to total ambient $PM_{2.5}$ concentrations in the Wasatch Front is currently unclear. However, it is worth noting that traffic volumes on I-15 increased by more than 28% between 2000 and 2005, but the average annual PM_{10} concentration at a nearby monitor decreased by nearly 22% during this period, which suggests that localized impacts from vehicle traffic might be a minor contributor to overall PM concentrations. (See Section 12.4.3.2, 5800 West Freeway Alternative, for further discussion.)

Even though the contribution of localized sources of $PM_{2.5}$ might be minor, construction of any of the MVC alternatives would likely result in some increase in localized $PM_{2.5}$ concentrations along the new alignment compared to the No-Action Alternative. As shown in Table 12.4-6 below, since MVC would draw traffic from I-15 and most parallel arterials (such as Bangerter Highway), total traffic volumes on these other roads would be reduced compared to the No-Action Alternative, and there would be a corresponding reduction in $PM_{2.5}$ emissions. Shaded cells in the table indicate locations where 2030 traffic volumes would be higher than those under the No-Action Alternative.

Table 12.4-6. 2030 Traffic Volumes on Roadways Parallel to the MVC

Alternative	SR 111	5600 West	Bangerter Highway	I-215	I-15
Salt Lake County Alternatives					
No-Action	52,700	34,700	83,400	167,000	271,000
5800 West Freeway	34,300	24,000	60,800	157,000	246,000
5800 West Freeway with Tolling	45,000	34,900	77,700	167,000	259,000
7200 West Freeway	28,900	29,900	63,000	154,000	247,000
7200 West Freeway with Tolling	45,100	38,800	78,800	166,000	260,000

Alternative	Redwood Road	Lehi Main Street	1000 South	I-15
Utah County Alternatives				
No-Action	47,300	24,100	50,200	228,000
Southern Freeway	28,000	16,800	26,400	232,000
Southern Freeway with Tolling	45,500	20,500	40,100	231,000
2100 North Freeway	26,500	18,300	22,300	181,000
2100 North Freeway with Tolling	46,500	22,700	44,700	214,100
Arterials	26,300	15,000	26,400	213,000
Arterials with Tolling	44,200	15,700	27,400	218,000

Shading indicates a road with 2030 traffic volumes that are higher than those under the No-Action Alternative.

Changes in travel speeds could also have an impact on $PM_{2.5}$ emissions. EPA's MOBILE6.2 model does not predict how PM emission rates change with speed, but it is reasonable to assume that, to the extent that congestion relief provided by the MVC would reduce stop-and-go traffic conditions and vehicle idling, it would reduce $PM_{2.5}$ emissions on the affected roads. Also, in cases where the MVC reduces traffic volumes on arterial roads with signalized intersections, it would reduce $PM_{2.5}$ emissions from vehicles idling at those intersections.

The PM_{10} emission impacts of the tolling and transit options are discussed later in this chapter. To the extent that tolling and the presence of transit would reduce traffic volumes on the Mountain View Corridor roadway alignments, they would also tend to reduce localized concentrations of $PM_{2.5}$.

Regional Impacts. Elevated concentrations of $PM_{2.5}$ generally occur during periods of prolonged temperature inversions along the Wasatch Front. Elevated $PM_{2.5}$ concentrations can also occur in response to natural events during non-inversion seasons, such as wildfires or periods of prolonged high winds. $PM_{2.5}$ comes from both regional background and local sources and is both a regional and localized air quality concern under specific circumstances.

While secondary formation from $PM_{2.5}$ precursors is an important component to the regional $PM_{2.5}$ air quality problem, directly emitted $PM_{2.5}$ from local sources can cause or contribute to elevated localized $PM_{2.5}$ concentrations. The relative contributions of localized impacts, regional background impacts, and airborne transport of $PM_{2.5}$ from other states will not be known until Utah completes the technical analysis for a revision of the State Implementation Plan that addresses $PM_{2.5}$.

At the national level, EPA has established several control programs that will reduce emissions from most major sources of $PM_{2.5}$ and its precursor pollutants. EPA's Tier 2 light-duty vehicle regulations and 2007 heavy-duty vehicle standards, along with control of the sulfur content of fuels, are expected to reduce motor vehicle emission rates by 59% between 2005 and an assumed opening year of 2015, with an additional 25% reduction between 2015 and 2030. EPA's May 2004 nonroad engine regulations (EPA 2004) will take effect in 2008 and will reduce particulate matter and NO_x emissions from these vehicles by 90% by 2030.

In March 2007, EPA proposed new regulations to reduce locomotive emissions of particulate matter by 90% and NO_x by 80% (EPA 2007b). Finally, regional programs to reduce visible air pollution, which are being coordinated by an interstate planning group known as the Western Regional Air Partnership, will also have beneficial impacts on ambient $PM_{2.5}$ concentrations.

Regional PM_{10} modeling for conformity by WFRC and MAG shows declines in vehicle emissions rates over time that largely reflect national trends (WFRC 2007; MAG 2007). When growth in regional vehicle-miles traveled (VMT) is taken into account, NO_x emissions decline throughout the planning period, while PM_{10} emissions increase slightly between 2015 and 2030 (although levels remain well below the applicable emission budgets set to prevent violations of the PM_{10} air quality standards).

With respect to alternative-specific regional impacts, the PM_{10} emissions analysis performed for the MVC provides some guidance as to likely emissions of $PM_{2.5}$. Table 12.4-5, Regional Mesoscale Air Quality with the Salt Lake County Roadway Alternatives in 2030, and Table 12.4-9, Regional Mesoscale Air Quality with the Utah County Alternatives in 2030, below, provide regional emissions estimates for direct PM_{10} emissions (from vehicle tailpipe exhaust, brake wear, and tire wear), PM_{10} road dust, and NO_x. These same pollutants contribute in varying degrees to $PM_{2.5}$ concentrations. Nearly all PM_{10} vehicle exhaust, and nitrate particles formed from gaseous NO_x emissions, are in the $PM_{2.5}$ and smaller size range, while only a small fraction of brake wear, tire wear, and road dust are in the $PM_{2.5}$ size range. A large decline in total emissions is expected between the base year (that is, existing conditions) and the project design year, which will contribute to reduced concentrations, and there are small differences in total regional emissions between the various alternatives (less than 1%).

Mobile-Source Air Toxics

In addition to the criteria pollutants for which there are NAAQS, EPA also regulates air toxics. Most air toxics originate from human-made sources including on-road mobile sources, non-road mobile sources (such as airplanes), area sources (such as dry cleaners), and stationary sources (such as factories or refineries).

MSATs are a subset of the 188 air toxics defined by the Clean Air Act. MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

EPA is the lead federal agency for administering the Clean Air Act and has specific responsibilities for determining the health effects of MSATs. On March 29, 2001, EPA issued a Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources (66 Federal Register 17229). In its rule, EPA examined the impacts of existing and newly promulgated mobile-source control programs, including its reformulated gasoline program, its national low-emission vehicle standards, its Tier 2 motor vehicle emissions standards and gasoline sulfur-control requirements, and its proposed heavy-duty engine and vehicle standards and on-highway diesel fuel sulfur-control requirements. Between 2000 and 2020, FHWA projects that, even with a 64% increase in vehicle-miles traveled, these programs will reduce on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde by 57% to 65% and will reduce on-highway diesel particulate emissions by 87%.

In February 2007, EPA issued a final rule to reduce hazardous air pollutants from mobile sources. The final standards will lower emissions of benzene and other air toxics in three ways: (1) by lowering the benzene content in gasoline, (2) by reducing exhaust emissions from passenger vehicles operated at cold temperatures under 75 °F, and (3) by reducing emissions that evaporate from, and permeate through, portable fuel containers.

Under this rule, EPA expects that new fuel benzene and hydrocarbon standards for vehicles and gas cans will reduce total emissions of mobile-source air toxics by 330,000 tons in 2030, including 61,000 tons of benzene. As a result, new passenger vehicles will emit 45% less benzene, gas cans will emit 78% less benzene, and gasoline will have 38% less benzene overall.

Unavailable Information for Project-Specific MSAT Impact Analysis

This section includes a basic analysis of the likely MSAT emission impacts associated with the proposed Mountain View Corridor project. The available technical tools do not allow FHWA and UDOT to predict the project-specific health impacts of the MSAT emissions associated with the MVC. Due to these limitations, the following discussion is included in accordance with the regulations of the Council on Environmental Quality (40 CFR 1502.22(b)) regarding incomplete or unavailable information.

Information That Is Unavailable or Incomplete

Evaluating the environmental and health impacts of MSATs from a proposed highway project would involve several key elements, including emissions modeling, dispersion modeling to estimate ambient concentrations resulting from the estimated emissions, exposure modeling to estimate human exposure to the estimated concentrations, and then a final determination of health impacts based on the estimated exposure. Each of these steps is limited by technical short-comings or scientific uncertainty that prevents a more complete determination of the health impacts of MSATs from the Mountain View Corridor project.

Emissions. The EPA tools for estimating MSAT emissions from motor vehicles are not sensitive to key variables needed to determine the emissions from highway projects. Although the MOBILE6.2 model is used to predict emissions at a regional level, it has limited applicability at the project level. MOBILE6.2 emission factors are based on a typical trip length of about 7.5 miles, with average speeds for such typical trips. As a result, MOBILE6.2 does not have the ability to predict emission rates for a specific vehicle operating condition at a specific location at a specific time. Because of this limitation, MOBILE6.2 can only approximate the operating speeds and levels of congestion likely to be present on large-scale projects and cannot adequately capture the emissions effects of smaller projects. In its discussions of particulate matter under the conformity rule, EPA has identified problems with MOBILE6.2 as a general impediment to quantitative analysis.

These deficiencies compromise the ability of MOBILE6.2 to accurately estimate MSAT emissions. MOBILE6.2 is an adequate tool for projecting emission trends and performing relative analyses between alternatives for very large projects, but it is not sensitive enough to capture the effects of travel changes tied to smaller projects or to predict emissions near specific roadside locations.

Dispersion. The tools to predict how MSATs disperse in the environment are also limited. Current regulatory models (for example, CAL3QHC) were developed and validated more than 10 years ago for predicting episodic concentrations of carbon monoxide to determine compliance with the NAAQS.

The performance of dispersion models is more accurate for predicting maximum concentrations that can occur at a specific time and location in a geographic area. This limitation makes it difficult to predict accurate exposure patterns at specific times at specific highway project locations across an urban area to assess the potential health risk. The National Cooperative Highway Research Program is conducting research on best practices in applying models and other technical methods to assist in the analysis of MSATs. This work also will focus on identifying appropriate methods of documenting and communicating MSAT impacts in the NEPA process and to the general public. Along with these general limitations of dispersion models, there is also a lack of monitoring data in most areas for use in establishing project-specific MSAT background concentrations.

Exposure Levels and Health Effects. Finally, even if emission levels and concentrations of MSATs could be accurately predicted, limitations in current techniques for exposure assessment and risk analysis prevent FHWA from reaching meaningful conclusions about project-specific health impacts. Exposure assessments are difficult because it is difficult to accurately calculate annual concentrations of MSATs near roads and to then determine the portion of a year that people are actually exposed to those concentrations at a specific location. These difficulties are compounded for determining 70-year cancer assessments, especially because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over a 70-year period. There are also considerable uncertainties associated with the existing estimates of toxicity of the various MSATs, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population. Because of these shortcomings, any calculated difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with calculating the impacts. Consequently, the results of such assessments would not be useful to decision-makers, who would need to weigh this information against other project impacts that are better suited for quantitative analysis.

Summary of Existing Credible Scientific Evidence Relevant to Evaluating the Impacts of MSATs

Research into the health impacts of MSATs is ongoing. For different emissions, there are a variety of studies indicating that some emissions are either statistically associated with adverse health outcomes (frequently based on emission levels found in occupational settings) or indicating that laboratory animals demonstrate adverse health outcomes when exposed to large doses.

Exposure to air toxics has been the focus of a number of EPA efforts. Most notably, the agency conducted the National Air Toxics Assessment (NATA) in 1996 to evaluate modeled estimates of human exposure applicable at the county level. While not intended for use as a measure of or benchmark for local exposure, the modeled estimates in the NATA database best illustrate the levels of various toxics when aggregated to a state or national level.

EPA is in the process of assessing the risks of various kinds of exposures to these pollutants. The EPA Integrated Risk Information System (IRIS) is a database of human health effects that could result from exposure to various substances found in the environment. The following toxicity information for the six prioritized MSATs was taken from the IRIS database Weight of Evidence Characterization summaries (www.epa.gov/iris). This information represents EPA's most current assessments of the potential hazards and toxicology of these chemicals or mixtures.

- **Benzene** is characterized as a known human carcinogen. Non-cancer effects include anemia and other blood disorders.
- **Acrolein's** potential carcinogenicity cannot be determined because the existing data are inadequate for an assessment of human carcinogenic potential for either the oral or inhalation route of exposure. Acrolein is thought to account for most of the non-cancer respiratory effects associated with air toxics, including upper respiratory tract irritation.
- **Formaldehyde** is a probable human carcinogen based on limited evidence in humans and sufficient evidence in animals. Non-cancer effects include eye, nose, and throat irritation.
- **1,3-butadiene** is characterized as carcinogenic to humans by inhalation. It also has non-carcinogenic reproductive and developmental effects.
- **Acetaldehyde** is a probable human carcinogen based on increased incidence of nasal tumors in male and female rats and laryngeal tumors in male and female hamsters after inhalation exposure.
- **Diesel exhaust** is likely to be carcinogenic to humans by inhalation from environmental exposures. Diesel exhaust is the combination of diesel particulate matter and diesel exhaust organic gases. Diesel exhaust also represents chronic respiratory effects, possibly the primary non-cancer hazard from MSATs. Prolonged exposures could impair pulmonary function and could produce symptoms such as cough, phlegm, and chronic bronchitis. Exposure relationships have not been developed from these studies.

There have been other studies that address MSAT health impacts in proximity to roadways. The Health Effects Institute, a non-profit organization funded by EPA, FHWA, and industry, has undertaken a major series of studies to research near-roadway MSAT hot spots, the health implications of the entire mix of mobile-source pollutants, and other topics. The final summary of the series is not expected for several years. A workshop sponsored by the Johns Hopkins School of Public Health (2004) concluded that residences close to roadways with high traffic density are associated with an increased risk of a broad spectrum of health outcomes in adults and children, including mortality, lung function, and lung cancer in adults, as well as respiratory symptoms including asthma/wheezing and lung function in children. Recent studies also support a finding of increased risk from exposure in proximity to transportation facilities. Two recent studies (McConnell and others 2006; Gauderman and others 2007) both observed a statistically significant association of increasing childhood asthma rates with decreasing distance to freeways in several California towns. A recent study (ICF International 2007) summarizes information and guidelines on available analytical models and techniques to assess MSAT impacts and how such information can be communicated in the environmental process.

Relevance of Unavailable or Incomplete Information to Evaluating Reasonably Foreseeable Significant Adverse Impacts on the Environment, and Evaluation of Impacts Based on Theoretical Approaches or Research Methods Generally Accepted in the Scientific Community

Because of the uncertainties discussed above, a quantitative assessment of the effects of air toxic emissions impacts on human health cannot be made at the project level. Although available tools do allow FHWA to reasonably predict relative emission changes between alternatives for large projects, the amount of MSAT emissions from each of the project alternatives and MSAT concentrations or exposures created by each of the project alternatives cannot be predicted with enough accuracy to be useful in estimating health impacts. (As noted above, the current emissions model is not capable of serving as a meaningful emissions analysis tool for smaller projects.) Therefore, the relevance of the unavailable or incomplete information is that it is not possible to determine whether any of the Mountain View Corridor alternatives would have “significant adverse impacts on the human environment.”

A quantitative evaluation of MSAT emissions from the MVC alternatives is presented below. This evaluation acknowledges that the MVC alternatives could cause increased exposure to MSATs, although the concentrations and duration of these exposures are uncertain. Because of this uncertainty, the health effects from these emissions cannot be estimated.

MSAT Modeling Results

Table 12.4-7 below shows the MSAT modeling results for the Salt Lake County roadway alternatives. Annual MSAT emissions for each individual MSAT would decrease under the No-Action Alternative over existing conditions due to EPA's ongoing programs to control hazardous air pollutants from mobile sources. Despite an increase of more than 104% in VMT between existing conditions and the No-Action Alternative, MSAT emissions would decrease by about 29% to more than 86% depending on the constituent.

The vehicle-miles traveled in the impact analysis area under the 5800 West Freeway Alternative would be about 14.7 million miles per day, compared to about 13 million miles per day under the No-Action Alternative (an increase of 12.2% over the No-Action Alternative). As shown in Table 12.4-7, MSAT emissions under the 5800 West Freeway Alternative would increase over the No-Action Alternative due to the increased VMT under the 5800 West Freeway Alternative, with increases ranging from about 9% to more than 12% over the No-Action Alternative.

Table 12.4-7. Mobile-Source Air Toxics Emissions from the Salt Lake County Roadway Alternatives in 2030

		Tons per Year					
Alternative	**Daily VMT (millions)**	**Acet-aldehyde**	**Acrolein**	**Benzene**	**1,3-Butadiene**	**Diesel Particulate Matter**	**Form-aldehyde**
Existing conditions	6.4	10.1	1.25	103.0	10.7	49.7	25.8
No-Action	13.1	7.08	0.838	61.1	6.22	6.51	18.2
5800 West Freeway (with tolling)	14.7 (14.0)	7.83 (7.54)	0.923 (0.890)	67.5 (64.8)	7.0 (6.7)	7.3 (7.0)	20.1 (19.4)
7200 West Freeway (with tolling)	14.5 (13.8)	7.76 (7.44)	0.916 (0.879)	66.9 (64.0)	6.9 (6.6)	7.2 (6.9)	19.9 (19.1)

Combined Impacts of the 5800 West Freeway and 5600 West Transit Alternatives (Both Options)

The 5800 West Freeway Alternative would be implemented with one of the two 5600 West Transit Alternative options.

The combined impacts of the 5800 West Freeway Alternative and either of the two transit options would be the same as those from the 5800 West Freeway Alternative by itself.

5800 West Freeway Alternative with Tolling Option

The daily vehicle-miles traveled under the 5800 West Freeway Alternative with Tolling Option would be about 600,000 miles per day less than the non-tolled 5800 West Freeway Alternative. The decrease in traffic volumes and vehicle-miles traveled would result in slightly lower emissions than the 5800 West Freeway Alternative by itself.

As shown in Table 12.4-5 above, Regional Mesoscale Air Quality with the Salt Lake County Roadway Alternatives in 2030, the daily pollutant emissions under this alternative would be about 47.31 tons per day, or about 0.45 ton per day more than the No-Action Alternative.

As shown in Table 12.4-7 above, Mobile-Source Air Toxics Emissions from the Salt Lake County Roadway Alternatives, the annual MSAT emissions under this alternative would increase over the No-Action Alternative with increases ranging from about 6% to 7.5% depending on the individual MSAT.

12.4.3.3 7200 West Freeway Alternative

As described in Chapter 2, Alternatives, this alternative would consist of a freeway extending from I-80 to the Utah County line.

Regional Air Quality

The regional air quality impacts from the 7200 West Freeway Alternative would be the same as those from the 5800 West Freeway Alternative.

Local Air Quality (CO and PM_{10})

Traffic volumes on the 7200 West Freeway Alternative would be less than those predicted on the 5800 West Freeway Alternative. Therefore, it is expected that the CO and PM_{10} impacts from the 7200 West Freeway Alternative would be less than those modeled for the 5800 West Freeway Alternative and would be within all applicable standards for CO and PM_{10}.

Regional Mesoscale Air Quality with the 7200 West Freeway Alternative in 2030

The vehicle-miles traveled under the 7200 West Freeway Alternative would be about 38.4 million miles per day, or about 1.1 million miles per day more than under the No-Action Alternative. As shown in Table 12.4-5 above, Regional Mesoscale Air Quality with the Salt Lake County Roadway Alternatives in 2030, the daily emissions of pollutants from this alternative would be about 47.29 tons per day, or about 0.02 ton per day less than the 5800 West Freeway Alternative and about 0.19 ton per day more than the No-Action Alternative.

$PM_{2.5}$

See the section titled $PM_{2.5}$ on page 12-28 for a discussion of $PM_{2.5}$.

Mobile-Source Air Toxics

The vehicle-miles traveled in the impact analysis area under the 7200 West Freeway Alternative would be about 14.5 million miles per day, compared to about 13 million miles per day under the No-Action Alternative (an increase of 10.7% over the No-Action Alternative). As shown in Table 12.4-7 above, Mobile-Source Air Toxics Emissions from the Salt Lake County Roadway Alternatives, MSAT emissions under the 7200 West Freeway Alternative would increase over the No-Action Alternative due to the increased VMT under the 7200 West Freeway Alternative, with increases for individual constituents ranging from about 9% to 11% over the No-Action Alternative.

Combined Impacts of the 7200 West Freeway and 5600 West Transit Alternatives (Both Options)

As with the 5800 West Freeway Alternative, the 7200 West Freeway Alternative would be implemented with one of the two 5600 West Transit Alternative options.

Traffic volumes on the 7200 West Freeway Alternative would be less than those predicted on the 5800 West Freeway Alternative. Therefore, the combined impacts of the 7200 West Freeway Alternative and the 5600 West Transit Alternative (both options) would be slightly less than those from the 5800 West Freeway Alternative by itself.

7200 West Freeway Alternative with Tolling Option

The daily vehicle-miles traveled under the 7200 West Freeway Alternative with Tolling Option would be less than those under the non-tolled 7200 West Freeway Alternative. The decrease in traffic volumes and vehicle-miles traveled would result in lower emissions than the 7200 West Freeway Alternative by itself.

As shown in Table 12.4-5 above, Regional Mesoscale Air Quality with the Salt Lake County Roadway Alternatives in 2030, the daily pollutant emissions under this alternative would be about 47.56 tons per day, or about 0.46 ton per day more than the No-Action Alternative.

As shown in Table 12.4-7 above, Mobile-Source Air Toxics Emissions from the Salt Lake County Roadway Alternatives, the annual MSAT emissions under this alternative would increase over the No-Action Alternative with increases ranging from about 5% to 6% depending on the individual MSAT.

12.4.4 Utah County Alternatives

In Utah County, three alternatives are under consideration: the Southern Freeway Alternative, the 2100 North Freeway Alternative, and the Arterials Alternative. In addition, a tolling option was evaluated for each Utah County alternative. Impacts under each combination of alternatives and options are discussed in the following sections.

12.4.4.1 Southern Freeway Alternative

As described in Chapter 2, Alternatives, this alternative would consist of a freeway extending from the Utah County line to I-15 at Lindon.

Regional Air Quality

The Mountain View Corridor project (a north-south alignment from the Salt Lake County line to SR 73) (Regional Transportation Plan Project No. 12) and an east-west alignment from Saratoga Springs to Lehi (Regional Transportation Plan Project No. 13) is included in the most recent regional transportation conformity analysis for Utah County (see Section 12.4.1.1, Mesoscale Evaluations for Regional Air Quality). In that 2030 analysis, all regionally significant transportation and transit projects were determined to be in compliance with the CO and PM_{10} emission budgets in the State Implementation Plan. The MVC would increase regional PM_{10} emissions by less than 1% in 2030 compared to the No-Action Alternative without the MVC (see Table 12.4-9, Regional Mesoscale Air Quality with the Utah County Alternatives in 2030, on page 12-41). Under these conditions, the Southern Freeway Alternative would be a minor source of CO and PM_{10} at the regional level.

Local Air Quality (CO and PM_{10})

As shown in Table 12.4-8, the highest traffic volumes for the Utah County alternatives (which would occur on the 2100 North Freeway Alternative) would be about 14% less than those predicted on the 5800 West Freeway Alternative. Therefore, the CO and PM_{10} impacts from the Southern Freeway Alternative would be less than those modeled for the 5800 West Freeway Alternative and would be within all applicable standards for CO and PM_{10}.

Table 12.4-8. Average Daily Traffic Volumes for the Utah County Alternatives in 2030

MVC Segment	Southern Freeway Alternative (with tolling)	2100 North Freeway Alternative (with tolling)	Arterials Alternative (with tolling)
Utah County line to SR 73	118,000 (33,000)	112,000 (37,000)	97,000 (36,000)
SR 73 to I-15	94,000 (22,000)	NA	NA
2100 North Freeway (MVC to I-15)	NA	136,000 (47,000)	NA

NA = not applicable

Regional Mesoscale Air Quality with the Southern Freeway Alternative in 2030

Table 12.4-9 below shows the pollutant emissions expected from the Utah County alternatives for those pollutants for which Utah County is either a non-attainment area or a maintenance area (PM_{10} and its precursors, NO_x). The vehicle-miles traveled in the region under the Southern Freeway Alternative would be about 18.8 million miles per day, or an increase of about 600,000 miles per day over the No-Action Alternative. The total regional emissions of criteria pollutants under the Southern Freeway Alternative would be about 9.3 tons per day, or about the same as the No-Action Alternative.

Table 12.4-9. Regional Mesoscale Air Quality with the Utah County Alternatives in 2030

		No-Action Alternative		Southern Freeway Alternative		2100 North Freeway Alternative		Arterials Alternative	
	Existing Conditions (2006)	Alternative	Percent Change from Existing Conditions	Alternative (with tolling)	Percent Change from No-Action (with tolling)	Alternative (with tolling)	Percent Change from No-Action (with tolling)	Alternative (with tolling)	Percent Change from No-Action (with tolling)
VMT (million miles/day)	10.1	18.2	80.2%	18.8 (18.1)	3.30% (–0.55%)	18.5 (18.2)	1.65% (0.00%)	18.4 (18.0)	1.10% (–1.10%)
Particulate Matter									
NO_x (tons/day)[a]	15.5	3.816	–75.4%	3.982 (3.781)	4.40% (–0.92%)	3.889 (3.799)	1.91% (–0.45%)	3.874 (3.771)	1.52% (–1.18%)
Direct PM (tons/day)	0.351	0.4599	31.0%	0.4757 (0.4578)	3.40% (–0.46%)	0.4687 (0.4599)	1.91% (0.00%)	0.4669 (0.4567)	1.52% (–0.70%)
Fugitive dust (tons/day)	4.06	5.051	24.4%	4.861 (4.884)	–3.76% (–3.31%)	4.978 (4.884)	–1.45% (–3.31%)	4.958 (4.848)	–1.84% (–4.02%)
Total PM emissions (tons/day)	19.91	9.328	–53.1%	9.319 (9.123)	–0.01% (–2.20%)	9.337 (9.143)	0.10% (–1.98%)	9.298 (9.076)	–0.32% (–2.70%)

[a] NO_x to PM_{10} conversion is not 100%. Therefore, NO_x overestimates total PM_{10} emissions.

Source: MAG 2007

$PM_{2.5}$

See the section titled $PM_{2.5}$ on page 12-28 for a discussion of $PM_{2.5}$.

Mobile-Source Air Toxics

Table 12.4-10 shows the MSAT modeling results for the Utah County alternatives. Annual MSAT emissions for each MSAT would decrease under the No-Action Alternative over existing conditions due to EPA's ongoing programs to control hazardous air pollutants from mobile sources. Despite an increase of more than 173% in VMT between existing conditions and the No-Action Alternative, MSAT emissions would decrease by about 5% to more than 82% depending on the constituent.

Table 12.4-10. Mobile-Source Air Toxics Emissions from the Utah County Alternatives in 2030

Alternative	Daily VMT (millions)	Tons per Year					
		Acet-aldehyde	Acrolein	Benzene	1,3-Butadiene	Diesel Particulate Matter	Form-aldehyde
Existing conditions	1.9	2.95	0.365	29.9	3.13	14.9	7.5
No-Action	5.2	2.76	0.326	23.8	2.47	2.6	7.1
Southern Freeway (with tolling)	5.9 (5.4)	3.1 (2.88)	0.365 (0.340)	26.7 (24.8)	2.8 (2.6)	3.0 (2.7)	7.9 (7.4)
2100 North Freeway (with tolling)	5.9 (5.5)	3.09 (2.92)	0.365 (0.344)	26.7 (25.2)	2.8 (2.6)	3.0 (2.7)	7.9 (7.5)
Arterials (with tolling)	5.8 (5.5)	3.03 (2.92)	0.357 (0.344)	26.1 (25.2)	2.7 (2.6)	2.9 (2.8)	7.8 (7.5)

The vehicle-miles traveled in the impact analysis area under the Southern Freeway Alternative would be about 5.9 million miles per day, compared to about 5.2 million miles per day under the No-Action Alternative (an increase of 13.5% over the No-Action Alternative). As shown in Table 12.4-7 above, Mobile-Source Air Toxics Emissions from the Salt Lake County Roadway Alternatives in 2030, MSAT emissions under the Southern Freeway Alternative would increase over the No-Action Alternative due to the increased VMT under the Southern Freeway Alternative, with increases ranging from about 11% to more than 15% over the No-Action Alternative.

Southern Freeway Alternative with Tolling Option

The daily vehicle-miles traveled under the Southern Freeway Alternative with Tolling Option would be about 700,000 miles per day less than the Southern Freeway Alternative by itself. The decrease in traffic volumes and vehicle-miles traveled would result in lower emissions than the Southern Freeway Alternative by itself.

As shown in Table 12.4-9 above, Regional Mesoscale Air Quality with the Utah County Alternatives in 2030, the daily pollutant emissions under this alternative would be about 9.1 tons per day, or about 0.2 ton per day less than the No-Action Alternative or the Southern Freeway Alternative by itself.

As shown in Table 12.4-10 above, Mobile-Source Air Toxics Emissions from the Utah County Alternatives, the annual MSAT emissions under this alternative would increase slightly over the No-Action Alternative with increases ranging from about 4% to 5% depending on the individual MSAT.

12.4.4.2 2100 North Freeway Alternative

As described in Chapter 2, Alternatives, this alternative would consist of a freeway extending from the Utah County line to SR 73 in Saratoga Springs and a lateral freeway extending east along 2100 North to I-15 in Lehi.

Regional Air Quality

The regional air quality impacts from the 2100 North Freeway Alternative would be the same as those from the Southern Freeway Alternative.

Local Air Quality (CO and PM_{10})

The highest traffic volumes on the 2100 North Freeway Alternative would be about 4% less than those predicted on the 5800 West Freeway Alternative. Therefore, the CO and PM_{10} impacts from the 2100 North Freeway Alternative would be less than those modeled for the 5800 West Freeway Alternative and would be within all applicable standards for CO and PM_{10}.

Regional Mesoscale Air Quality with the 2100 North Freeway Alternative in 2030

As shown in Table 12.4-9 above, Regional Mesoscale Air Quality with the Utah County Alternatives in 2030, the vehicle-miles traveled in the impact analysis area under the 2100 North Freeway Alternative would be about 18.5 million miles per day, compared to about 18.2 million miles per day under the No-Action Alternative. The total regional emissions of criteria pollutants under the 2100

North Alternative would be about 9.3 tons per day, or about the same as the No-Action Alternative.

$PM_{2.5}$

See the section titled $PM_{2.5}$ on page 12-28 for a discussion of $PM_{2.5}$.

Mobile-Source Air Toxics

The vehicle-miles traveled in the impact analysis area under the 2100 North Freeway Alternative would be about 5.9 million miles per day, compared to about 5.2 million miles per day under the No-Action Alternative (an increase of 13.5% over the No-Action Alternative). As shown in Table 12.4-7 above, Mobile-Source Air Toxics Emissions from the Salt Lake County Roadway Alternatives in 2030, MSAT emissions under the 2100 North Freeway Alternative would increase over the No-Action Alternative due to the increased VMT under the 2100 North Freeway Alternative, with increases ranging from about 11% to more than 15% over the No-Action Alternative.

2100 North Freeway Alternative with Tolling Option

The daily vehicle-miles traveled under the 2100 North Freeway Alternative with Tolling Option would be about 300,000 miles per day less than the 2100 North Freeway Alternative by itself. The decrease in traffic volumes and vehicle-miles traveled would result in slightly lower emissions than the 2100 North Freeway Alternative by itself.

As shown in Table 12.4-9 above, Regional Mesoscale Air Quality with the Utah County Alternatives in 2030, the pollutant emissions under this alternative would be about 9.1 tons per day, or about 0.2 ton per day less than the No-Action Alternative.

As shown in Table 12.4-10 above, Mobile-Source Air Toxics Emissions from the Utah County Alternatives, the annual MSAT emissions under this alternative would increase over the No-Action Alternative with increases ranging from about 4% to 6% depending on the individual MSAT.

12.4.4.3 Arterials Alternative

As described in Chapter 2, Alternatives, this alternative would consist of a series of arterial roadways throughout northern Utah County. The combination of arterials includes a freeway segment from the Utah County line to SR 73 and arterial roadways at Porter Rockwell Boulevard, 2100 North, and 1900 South.

Regional Air Quality

The regional air quality impacts from the Arterials Alternative would be the same as those from the Southern Freeway Alternative.

Local Air Quality (CO and PM_{10})

The highest traffic volumes on the Arterials Alternative would be about 25% less than those predicted on the 5800 West Freeway Alternative. Therefore, the CO and PM_{10} impacts from the Arterials Alternative would be less than those modeled for the 5800 West Freeway Alternative and would be within all applicable standards for CO and PM_{10}.

Regional Mesoscale Air Quality with the Arterials Alternative in 2030

As shown in Table 12.4-9 above, Regional Mesoscale Air Quality with the Utah County Alternatives in 2030, the vehicle-miles traveled under the Arterials Alternative would be about 18.4 million miles per day, compared to about 18.2 million miles per day under the No-Action Alternative. The total regional emissions of criteria pollutants under the Arterials Alternative would be about 9.3 tons per day, or about the same as the No-Action Alternative.

$PM_{2.5}$

See the section titled $PM_{2.5}$ on page 12-28 for a discussion of $PM_{2.5}$.

Mobile-Source Air Toxics

The vehicle-miles traveled in the impact analysis area under the Arterials Alternative would be about 5.8 million miles per day, compared to about 5.2 million miles per day under the No-Action Alternative (an increase of 11.5% over the No-Action Alternative). As shown in Table 12.4-7, above, Mobile-Source Air Toxics Emissions from the Salt Lake County Roadway Alternatives in 2030, MSAT emissions under the Arterials Alternative would increase over the No-Action Alternative due to the increased VMT under the Arterials Alternative, with increases ranging from about 9% to 12% over the No-Action Alternative.

Arterials Alternative with Tolling Option

The daily vehicle-miles traveled under the Arterials Alternative with Tolling Option would be about the same as the No-Action Alternative (about 18.2 million miles per day). As shown in Table 12.4-9 above, Regional Mesoscale Air Quality with the Utah County Alternatives in 2030, emissions under the Arterials Alternative with Tolling Option would be about the same as under the No-Action Alternative (9.3 tons per day).

As shown in Table 12.4-10 above, Mobile-Source Air Toxics Emissions from the Utah County Alternatives, the annual MSAT emissions under this alternative would increase over the No-Action Alternative with increases ranging from about 4% to 6% depending on the individual MSAT.

12.4.5 Mitigation Measures

The regional air quality evaluations prepared by WFRC for Salt Lake County and MAG for Utah County concluded that, in 2030, the region would be in compliance with the emission budgets in the State Implementation Plans (see Section 12.4.1.1, Mesoscale Evaluations for Regional Air Quality). If all regionally significant projects included in UDOT's regional transportation plan (including the Mountain View Corridor) are constructed, the NAAQS for CO and PM_{10} would not be exceeded in Salt Lake County and Utah County (these areas are non-attainment or maintenance areas for CO and/or PM_{10}).

Microscale (hot-spot) modeling was performed at the project level for CO in the Salt Lake City maintenance area and at the highest-volume interchange in the impact analysis area. This modeling found that the MVC would not cause the NAAQS for CO to be exceeded. Similarly, a qualitative evaluation of PM_{10} concluded that the MVC would not cause the NAAQS for PM_{10} to be exceeded.

Emission inventory modeling was conducted for MSATs. This modeling found that the total emissions in the air quality impact analysis area would improve over existing conditions due to technological improvements in the future.

As a result, FHWA and UDOT conclude that the proposed Mountain View Corridor project would not have a substantial impact on regional air quality, so no mitigation measures are proposed. For construction-related air quality mitigation, see Section 27.18.1, Air Quality Mitigation.

12.4.6 Cumulative Impacts

Regional modeling conducted by WFRC and MAG for the 2030 transportation conformity analyses demonstrated that all regionally significant transportation projects (including the Mountain View Corridor) would be in compliance with the NAAQS for CO and PM_{10}. In addition, Salt Lake City and the Provo/Orem metropolitan areas have been redesignated as CO maintenance areas. Finally, PM_{10} maintenance plans for Salt Lake and Utah Counties have been submitted to EPA for approval. Once the plans are approved by EPA, both counties will then be considered maintenance areas for PM_{10}.

Population growth in the air quality impact analysis area has had little effect on overall air quality as demonstrated by the continuing improvement in air quality throughout the region. Air pollutant emissions from the Mountain View Corridor alternatives would increase slightly due to increased growth and, consequently, increased vehicle-miles of travel in the future. This growth is expected to occur with or without the Mountain View Corridor project.

Overall, the growth in the area by 2030 would likely be the same with or without the Mountain View Corridor project. However, the project would help to reduce regional traffic congestion and improve travel times, which would help maintain compliance with air quality standards. Improved travel times throughout the region would reduce idling emissions of CO and volatile organic compounds. As a result, the project is expected to have minor cumulative impacts on regional emissions of air pollutants.

Fugitive Dust. During construction of the project and other developments in the corridor, fugitive-dust-control measures (such as watering roads) would be needed in certain areas to protect disturbed soils from wind erosion until permanent, stabilized cover is established. After the construction phase is completed, the soil would have a lower potential for wind erosion compared to its undeveloped state.

Vehicle Emissions. Vehicle emissions have continued to decrease substantially over time as EPA has imposed a series of tighter emission-control requirements on engine emissions. As the region’s vehicle fleet becomes newer and the older, high-emitting vehicles are replaced, it is expected that the more stringent emission standards will substantially offset the regional growth in vehicle-miles traveled. Although it is difficult to predict fleet-average emissions 20 to 30 years in the future, it is expected that the more stringent federal regulation of motor vehicle emissions will continue to drive vehicle emissions even lower, thus helping to offset the growth in vehicle-miles traveled.

Mobile-Source Air Toxics (MSATs). Most air toxics originate from human-made sources including on-road mobile sources, non-road mobile sources (such as airplanes), area sources (such as dry cleaners), and stationary sources (such as factories or refineries).

MSATs are a subset of the 188 air toxics defined by the Clean Air Act. MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

EPA is the lead federal agency for administering the Clean Air Act and has specific responsibilities for determining the health effects of MSATs. On March 29, 2001, EPA issued a Final Rule on Controlling Emissions of Hazardous Air Pollutants from Mobile Sources (66 Federal Register 17229). In its rule, EPA examined the impacts of existing and newly promulgated mobile-source control programs, including its reformulated gasoline program, its national low-emission vehicle standards, its Tier 2 motor vehicle emissions standards and gasoline sulfur-control requirements, and its proposed heavy-duty engine and vehicle standards and on-highway diesel fuel sulfur-control requirements. Between 2000 and 2020, FHWA projects that, even with a 64% increase in vehicle-miles traveled, these programs will reduce on-highway emissions of benzene, formaldehyde, 1,3-butadiene, and acetaldehyde by 57% to 65% and will reduce on-highway diesel particulate emissions by 87%.

In February 2007, EPA issued a final rule to reduce hazardous air pollutants from mobile sources. The final standards will lower emissions of benzene and other air toxics in three ways: (1) by lowering the benzene content in gasoline, (2) by reducing exhaust emissions from passenger vehicles operated at cold temperatures under 75 °F, and (3) by reducing emissions that evaporate from, and permeate through, portable fuel containers.

Under this rule, EPA expects that new fuel benzene and hydrocarbon standards for vehicles and gas cans will reduce total emissions of mobile-source air toxics by 330,000 tons in 2030, including 61,000 tons of benzene. As a result, new passenger vehicles will emit 45% less benzene, gas cans will emit 78% less benzene, and gasoline will have 38% less benzene overall.

12.4.7 Summary of Impacts

The combined impacts of the Salt Lake and Utah County alternatives will have a minor impact on overall regional air quality for the following reasons:

- Regional modeling conducted by WFRC and MAG for the 2030 transportation conformity analyses showed that all regionally significant transportation projects (including the Mountain View Corridor) would be in compliance with the NAAQS.
- The project-level analyses for CO and PM_{10} did not indicate that the NAAQS would be exceeded at the local level.
- The MSAT emission inventories for all alternatives in both counties showed minor emission differences between the action alternatives and the No-Action Alternative.
- Technological improvements in future years are expected to reduce vehicle emission rates, despite the increased vehicle-miles of travel.

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